AVIATION SAFETY SUMMARY FY2018

US Forest Service
National Interagency
Fire Center

SCOPE OF THIS REPORT

This Aviation Summary provides statistical information for aviation activities under the operational control of the US Forest Service (FS) and for Forest Service Owned and Operated or "Fleet" aircraft during Fiscal Year 2018. It includes information from SAFECOM reports, flight hour tracking, accident/incident analysis and reviews. Due to the volume and variations in aviation management policies and processes among agencies, states and cooperators, the taxonomy of the data is relevant only to Forest Service (FS) aviation management. Using this specific taxonomy provides for data integrity and allows FS aviation safety personnel to best gauge how well the agency Safety Management System (SMS) is working within the parameters they have direct influence over.

EXECUTIVE SUMMARY

The Forest Service incorporates Safety Management System principles as a core business practice to accomplish aviation safety goals. SMS is the international industry standard for aviation safety and provides the structure within a network of programs that includes aviation safety policy, promotion, assurance and risk management. Mishap prevention is influenced by the quality of information available that may affect our decisions, actions, behaviors and attitudes towards the work we do.

FISCAL YEAR (FY) 2018 AVIATION SAFETY SUMMARY	
FLIGHT HOURS	87,475
# SAFECOM REPORTS	436
# ACCIDENTS	3
# INCIDENTS (*investigated*)	3
# FATALITIES	0

The Interagency SAFECOM reporting system satisfies Federal Aviation Regulation requirements for incident reporting, but more importantly, it provides management and front line supervisors with information about aviation concerns, issues or hazards as they occur. Although the primary purpose of the SAFECOM system is for timely reporting of safety concerns, data from the reports can be monitored and trended to detect issues that could potentially affect safety. Reporting allows aviation users and managers to take appropriate actions as a defense, helping to prevent mishaps from occurring.

*Note: the symbol "#" seen throughout this report refers to **number**, (not a hashtag).*

## THE FOREST SERVICE AVIATION PROGRAM

Approximately 300 employees at the Washington Office, Regional Offices and Forest levels administer the Forest Service aviation program. The national staff is located in Washington D.C. and at the National Interagency Fire Center in Boise, Idaho. The vast majority of aviation personnel are located throughout the forests, where local forest and regional staff provide day-to-day operational oversight and program guidance within their respective regions/units.

The Forest Service utilized over 600 aircraft in FY 2018. These include government-owned and leased, but primarily contracted aircraft. Numerous state agencies and county municipalities operate aircraft that have been acquired for use under the Federal Excess Personal Property (FEPP) program. Under the FEPP program, the Forest Service holds the registration and transfers the aircraft to authorized programs (bailed agreements). These aircraft are not included in statistics or mishap data as operational control typically resides with the operator (state or county municipality), unless the aircraft is operating on a FS controlled incident or mission.

Missions: The primary mission of Forest Service Aviation is to support natural resource programs including, but not limited to:

- Aerial delivery of firefighters by parachute, rappel rope, or on site landing
- Air tactical command and control
- Surveillance, reconnaissance, and intelligence gathering
- Infrared detection & mapping
- Aerial delivery of fire retardant and water
- Passenger transport for firefighting and resource missions

- Administrative flights
- Research
- Forest rehabilitation
- Forest Health Protection (aerial surveys, application and photography)
- Law enforcement
- Aerial photography
- Emergency Medical Assistance

Safety Management Systems (SMS) influences the organizational culture. SMS practices involve engaging people to make safety a shared responsibility and recognizing the value of teamwork across aviation disciplines (operations, safety, airworthiness, training, etc.). Organizing aviation operations with an SMS mindset allows the agency to maintain control over the key factors that affect safety performance. This structure provides an effective and proven way to organize and apply what we know so that we continue to learn and make necessary adjustments in a tangible, measurable way.
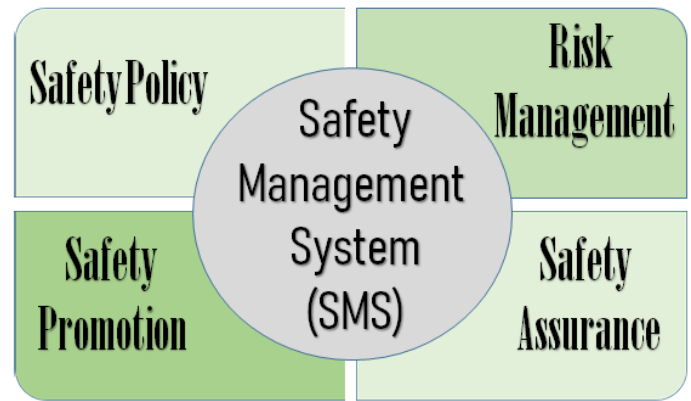
A Safety Management System provides the organizational framework to construct and support a sound safety culture that actively controls risk exposure. The goal is to develop a safety culture that achieves and maintains a zero accident rate. In order to accomplish this, we need to maintain the capability to continuously seek out and eliminate latent defects within our systems and culture.

The components providing the framework for SMS are briefly described below:

**Policy** formalizes the agency's fundamental approach to achieve acceptable or tolerable safety. It identifies management commitment, responsibility and accountability for the program and the appointment of key safety personnel.

**Risk Management** is the core of the SMS. It is the avenue to recognize and address hazardous conditions at a point where they can be effectively managed. It involves identifying the hazards, assessing the risk, analyzing the risk, and controlling/mitigating the risk. This is a fundamental activity that relies on the detecting and reporting of hazards by people who coexist with or encounter them.

**Assurance** activities are designed to monitor our aviation activities and provide us with adequate confidence that our system achieves an acceptable or tolerable level of safety. Assurance activities and controls include quality assurance audits and reviews, pre-use inspections, review and analysis of historical data, accident/incident investigation, error analysis, and corrective action plans.

**Promotion** includes processes and procedures that ensure our personnel are trained, informed and competent to perform duties in the safest manner possible. This includes communication of safety issues in the form of alerts, bulletins, and lessons learned that provide a sense of purpose to safety efforts. Promoting safety in the agency helps to build and sustain a culture that goes beyond merely avoiding accidents or reducing the number of incidents, it sets the stage for aviation personnel to do the right thing at the right time in response to both normal and emergency situations.

Tracking aviation activities is critical in establishing confidence in the agency's performance as SMS implementation continues to evolve. Tracking, reporting and sharing safety information feeds the safety culture and provides a means to compare safety efforts with outcomes.

Data capturing of aviation information (audits/reviews, SAFECOM system, investigations, etc.) involves collecting both *leading and lagging indicators* of safety performance. Capturing both types of data helps us identify and understand potential weaknesses in our safety efforts so we can adjust and predict future success. ***Leading indicators*** are focused on future safety performance and continuous improvement. These measures are proactive in nature and report on efforts completed on a regular basis to help identify safety issues and correct them to help prevent mishaps. Examples include: quality assurance program audits, aviation safety training, implementation of accident recommendations and base reviews. ***Lagging indicators*** are the traditional safety metrics that display accident and fatality numbers and rates. The reactionary nature of lagging indicators makes them an imprecise indicator of safety.

Leading Indicators -are data collected on proactive safety efforts that can be utilized to prevent undesirable outcomes.

Audits ~Reviews ~ Training ~ Safety Publications

Lagging indicators—measure undesirable outcomes

~Accident ~ Incidents ~ Investigations

LEADING INDICATORS

POLICY

� Updates to Forest Service Manual (FSM) 5700 complete
➤ Provided technical expertise to several Interagency guides and handbooks updates
➤ SMS Guide updates ongoing
➤ Aviation Mishap Response Guide (AMIG) Drafted
➤ Started process for designated Accountable Executive
➤ Coordinated with OAS and FAA on SAFO 18004
➤ Finalized ALSE Handbook

RISK MANAGEMENT

➤ Provided Safety Officer oversight to the HC-130H Airtanker program
➤ Provided representation (chair) to newly formed Risk Management Council under NIAC
➤ Organized and held a Drop Summit to address risk associated with retardant drops

SAFEY ASSURANCE

➤3 WO-NIFC Air Safety Investigators attended NTSB Training to maintain Investigation Qualifications

➤ Participated in contract technical evaluation board proposals
➤ Participated in quality assurance reviews
➤ Finalized Accident recommendations for 3 Accidents (Lockhaven, Cessna 206, and De Soto)
➤ Initiated the development of the FS FOQA program

SAFETY PROMOTION

➤ Published Annual Aviation Safety Report
➤ Presented Aviation Safety Briefing at Helicopter Association International (HAI)
➤ Provided administrative review to all USFS and State SAFECOMs and management of all WO, Vendor and some State SAFECOMs (State admin where agreements exist)
➤ Published a combined total of 25 Safety Alerts, Technical Bulletins, Lessons Learned, Accident Prevention Bulletins and Information Bulletins
➤ Presented A-200 Aviation Mishap Reviews at HAI, ACE and at several Regional/Forest Level trainings
➤ Delivered Crew Resource Management (CRM) 7 Skills Training:
  - Initial CRM– 15 classes with 300+ FS & Inter-Agency students completing
  - Refresher CRM- 8 classes with 140+FS & Inter-Agency students completing
  - Train the Trainer- 2 classes with 35+ FS & Inter-Agency students completing
➤ Evaluated 15 USFS CRM 7 Skills Facilitators
➤ Provided CRM Updates to the UAS program
➤ Delivered 3 SMS presentations
➤ Participated in Airtanker Company AARs
➤ New 508 Compliant Aviation Safety Website under contruction: All electronic and information technology posted on the new Website will be accessible to people with disabilities in compliance with the Workforce Rehabilitation Act of 1973.
➤ Provided instruction to various risk management sessions nationally (A-205; 305)

SAFECOM STATISTICAL SUMMARY

The SAFECOM statistical summary is comprised of both narrative and graphic displays that present the Forest Service SAFECOM data submitted to the Interagency SAFECOM database. In fiscal year (FY) 2018 there were 436 Forest Service SAFECOMs submitted; the 10-year average of SAFECOMs submitted annually is 471.

USFS Fleet/Leased aircraft are not separated in the SAFECOM data system and are reported under the actual type of aircraft; fixed-wing, airtanker or helicopter.

The SAFECOM system originated as a voluntary reporting system for the identification and tracking of hazards in an effort to prevent mishaps. The sole purpose of the SAFECOM system is for accident prevention. It is a tool used to encourage the reporting of any condition, observance, act, maintenance problem, or circumstance which has the potential to cause an aviation or aviation-related accident. The SAFECOM report is not a substitute for taking immediate needed action.   The first step to dealing with a safety issue is to try to correct the situation at the lowest level possible and follow-up with a SAFECOM to document. If the safety issue requires subject matter expertise to resolve, contact the Regional Aviation Safety Manager (RASM) to facilitate collaboration with Regional subject matter experts; for example: Aviation Maintenance Inspectors (AMI), Helicopter Operations Specialist (HOS), and Helicopter Inspector Pilots (HIPs).

Note: *The SAFECOM system is not a venue to launch complaints or to seek punitive action. Although used to provide statistics, the SAFECOM system is primarily a communication tool to report hazards and safety issues allowing appropriate action to be taken in a timely manner. SAFECOM reports can alert aviation managers to emerging safety trends allowing them to be reversed. SAFECOM reports are also used to identify good decisions and positive safety events that can generate Airwards.*

MARGIN OF ERROR—SAFECOM REPORTING AND STATISTICS

The information pulled from the SAFECOM system is highly contingent on a positive safety reporting culture. It is known that not all safety issues and concerns are being reported. Therefore, the data displayed in this report is considered a representative sample, rather than a complete capture of all safety issues. To continue to build trust in the system and improve the reporting culture, it is imperative that use of the SAFECOM system is promoted appropriately by aviation supervisors and that SAFECOMs are never used punitively or sent to the public-viewable side un-sanitized.

## SAFECOM SUMMARY—TOTAL # SAFECOM REPORTS—ALL CATEGORIES FY18

The overall total of SAFECOMs reported in FY18 for all agencies is 962 (**436 Forest Service**, 392 DOI, 126 State and 8 Other/Unknown/Military/Vendor).   45.3% of all SAFECOMs submitted in FY18 were under Forest Service operational control.

The graph to the below shows the total number of SAFECOM reports by main category. ***The total number of SAFECOMs by category shown below will exceed the total number of reported SAFECOMs, as each report may have more than one category assigned.***   For example, an Incident or Hazard SAFECOM may also have a Maintenance component.

Total # SAFECOM Reports by Main Category FY18
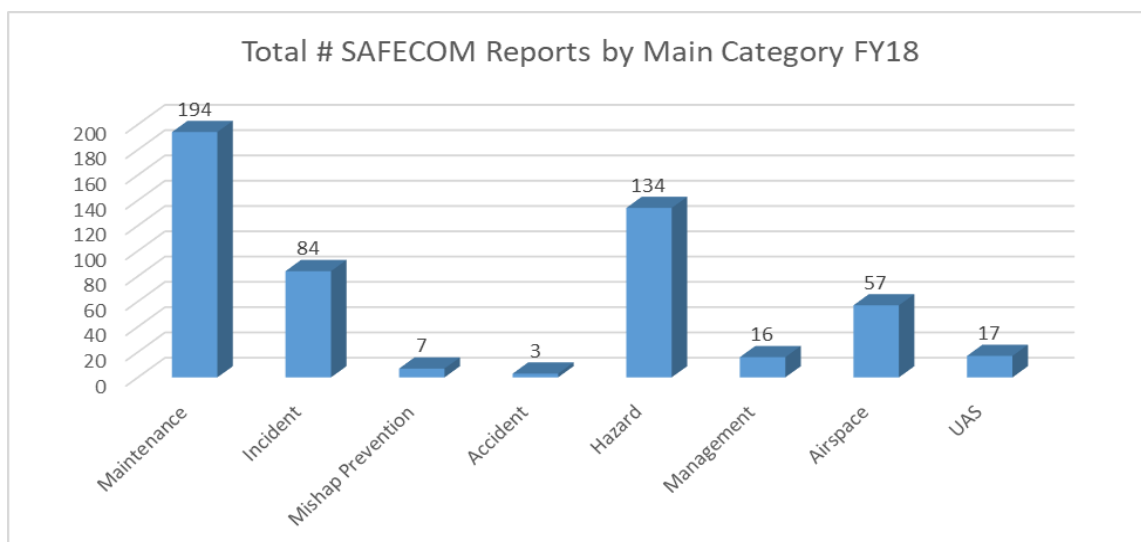
The 10 most reported USFS SAFECOMs in FY2018 were:

- Maintenance - Engine (38),
- Airspace - Intrusion (29),
- Maintenance – Electrical (26),
- Hazard – Communication (25),
- Hazard – Mission Equipment (24).
- Maintenance – Hydraulic (20),
- Maintenance – Chip Light (17),
- Maintenance – Fuel (15)
- Maintenance – Mission Equipment (15),
- Hazard – Policy Deviation (15)
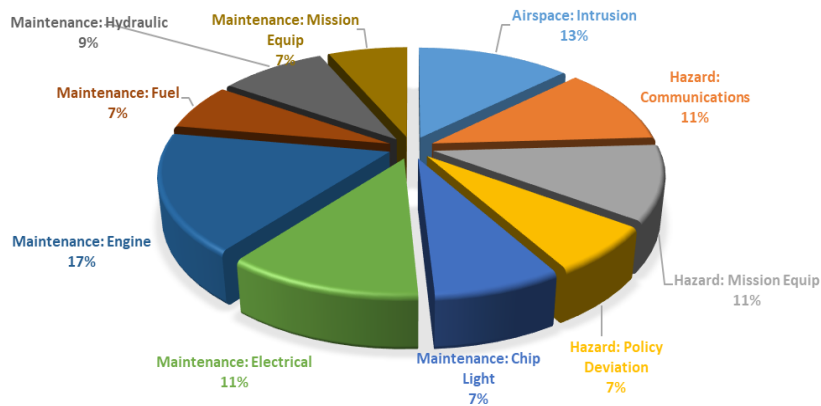
Percentages—10 most reported categories FY18

Other notables: Incident – Bird Strike (14), Incident – Other (14), Airspace – UAS (13)

Number of SAFECOMs per Aircraft Type—FY18:

The graph displayed below suggests a positive relationship between the number of SAFECOMs reported and the number of hours flown per aircraft type The table below the graph shows the frequency of reporting per 1000 hrs. of flight.
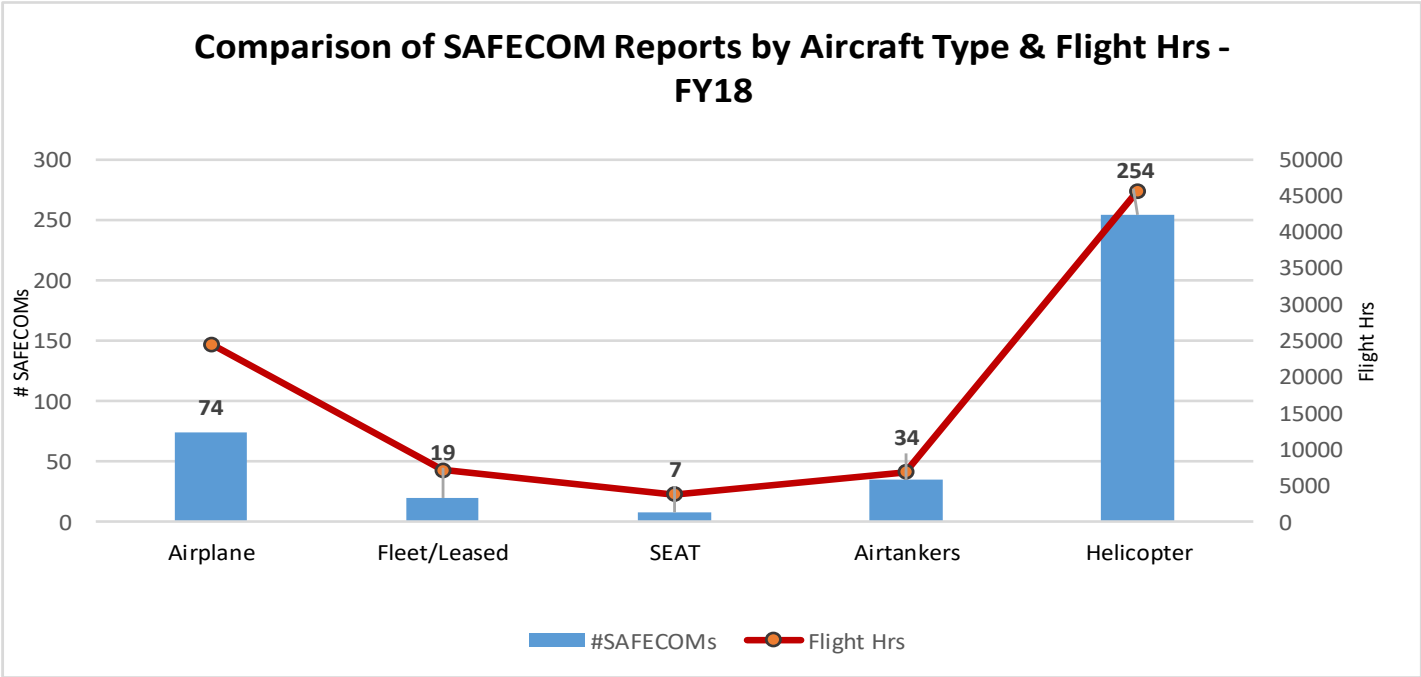
Aircraft Type	# SAFECOMS	Flight Hrs.	Reporting Frequency: #Reports per 1000 hrs. of flight
Airplane	74	24,443	3.02
Fleet/Leased	19	7,051	2.69
SEAT	7	3,673	1.91
Airtankers	34	6,762	5.02
Helicopter	254	45,546	5.58

*Does not include SAFECOM Categories UAS, NA, and Other .*

ACCIDENT

The FS experienced three (3) Aircraft Accidents in FY18, with two people being seriously injured; there were no fatalities. Refer to pages 16 through 19 for more detailed information regarding aircraft accidents.
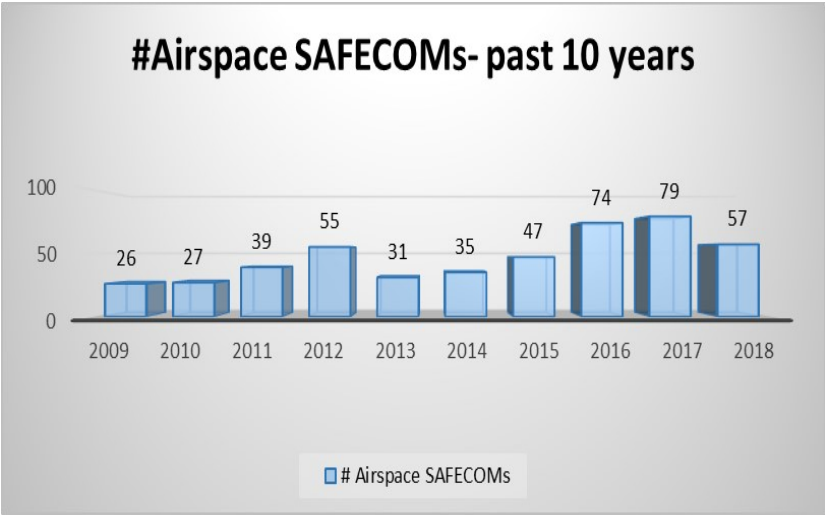
AIRSPACE

There were a total of 57 Airspace SAFECOMs reported in 2018; the 10 year average is 47. There were two near mid-air events; the10-year average is 2.4. There were 29 airspace intrusions; 11 of those reports were intrusions by UAVs (Unmanned Aerial Vehicles). These events are also often categorized as Airspace- UAS. There were 12 Airspace conflict SAFECOMs, mostly attributed to breakdowns in communications during tactical operations, where incident aircraft were unaware of the locations of other incident aircraft. (*Note: UAV refers to the vehicle itself and UAS is an all-encompassing term describing the entire operating system for the UAV: the ground control station with operator, communications equipment, support equipment etc.*).
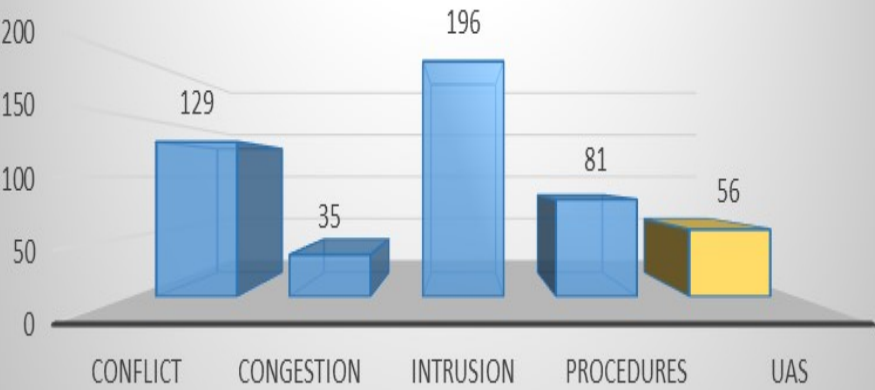
Top 5 Airspace Subcategories - FY18
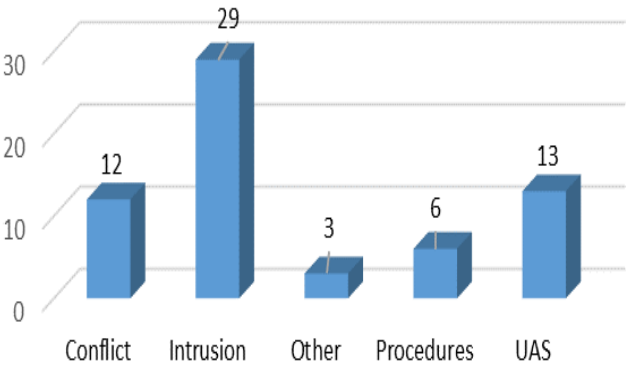
#Airspace SAFECOMs- past 10 years

TOP 5 Airspace Reports (10-Year Totals)

* When unauthorized UAVs were encountered in the Airspace, aviation operations were shut down until deemed safe to return.
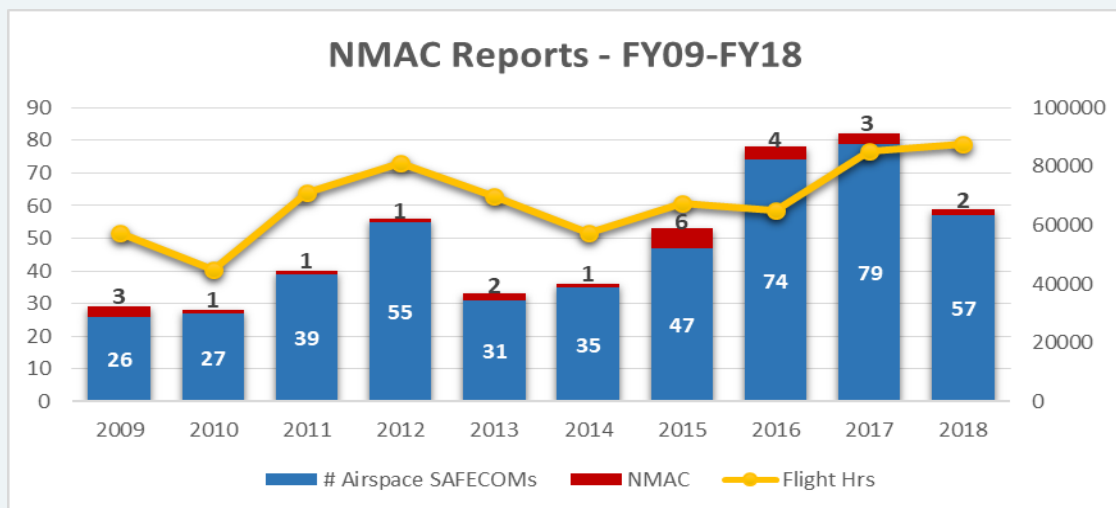
Note: UAS has reached the Top 5 in the 10 year totals with only 3 years' worth of recorded data.

IF YOU FLY, WE CAN'T!
RECREATIONAL DRONES NEAR WILDFIRES ARE NOT SAFE

#IFYOUFLYWECANT #NODRONESINFIREZONES

7

The number of near mid-air collision (NMAC) reports continue to be monitored. Near Mid-Air Collisions are a tangible threat, especially in active Fire Traffic Areas where incident aviation operations are often conducted under adverse flight conditions that include congested airspace with multiple aircraft types, reduced visibility, low level flying, poor weather/turbulence and mountainous terrain. These conditions add risk and complexity to the missions and create environments that can contribute to near mid-air events.

The Forest Service has a 10-year average of about 2.4 NMAC reports per fiscal year (24 reports from FY09-FY18). A near mid–air collision is defined by the Federal Aviation Administration (FAA) as "an incident associated with the operation of an aircraft in which a possibility of a collision occurs as a result of proximity of less than 500 feet to another aircraft and/or where a report is received from a pilot or other flight crew member stating that a collision hazard existed between two or more aircraft."

Near Mid Air Collisions are reported in the SAFECOM system under the Category/Subcategory of **Airspace/Near Mid -Air**. As with many SAFECOM categories, NMACs are reported on a voluntary basis, and not in accordance with an agency or FAA regulatory requirement. The data collected is based on the number NMACs that are actually reported. The graph below is therefore subjective and the number of NMAC reports filed may not be representative of what is actually happening. Therefore, this data does not calculate NMAC rates (NMAC per 100,000 hours of flight) because it is unlikely to result in a metric that is a valid indicator of safety performance. Flight hours are displayed to provide context between the number of reports and the amount of hours of exposure.

NMAC Reports - FY09-FY18

Legend: # Airspace SAFECOMs, NMAC, Flight Hrs

Bar data (# Airspace SAFECOMs / NMAC):
- 2009: 26, NMAC 3
- 2010: 27, NMAC 1
- 2011: 39, NMAC 1
- 2012: 55, NMAC 1
- 2013: 31, NMAC 2
- 2014: 35, NMAC 1
- 2015: 47, NMAC 6
- 2016: 74, NMAC 4
- 2017: 79, NMAC 3
- 2018: 57, NMAC 2

Brief Description of Near-Mid Air Reports—FY18
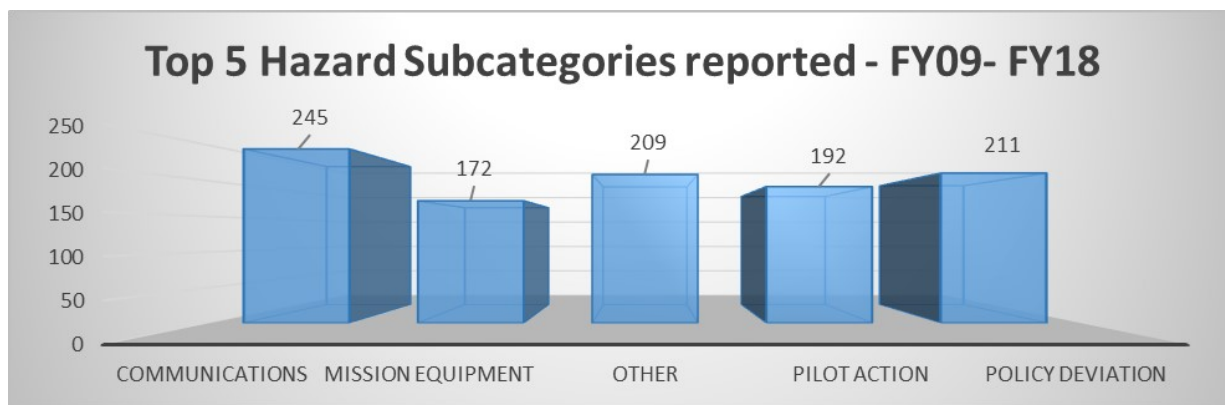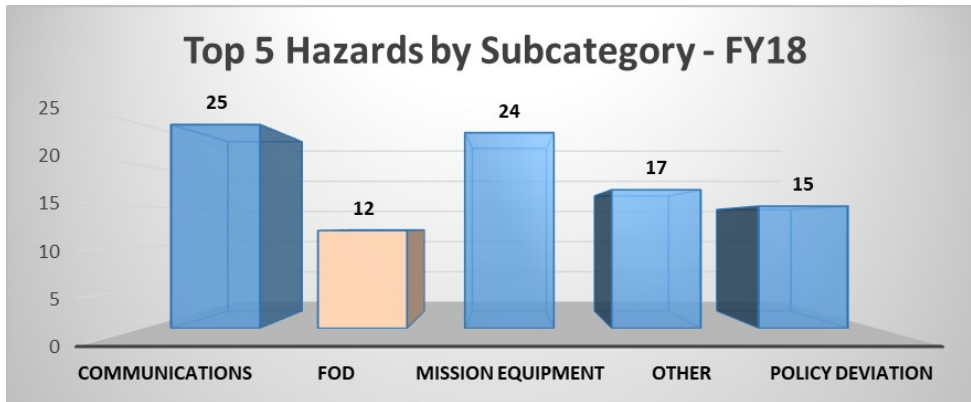
SAFECOM # 18-0860

A near mid-air occurred between a type 3 and a type 1 helicopter when they encountered each other while completing different missions in the same vicinity. One aircraft was doing bucket work and was enroute to the drop and encountered the other aircraft on final to a helispot with an external load. The bucket helicopter made a quick climbing right turn to create more room between the flight paths. Corrective action included all aircraft confirm locations with air attack and announce their locations and mission while operating in the same area of the fire.

SAFECOM #18-0714

While orbiting a fire at ~1000 AGL for a size-up, a detection airplane encountered a glider at close range and at about the same altitude. The detection aircraft broke off to avoid the risk of a mid-air collision. Contact was made with the glider pilot, who had actually called in the fire and had returned to take a look. The glider pilot was informed about the dangers of remaining on scene as agency aircraft will quickly respond to the scene and the best course of action is to depart the incident to avoid conflict. Corrective action included that the pilot and observer devote extra attention to visual scanning before approaching an incident.

HAZARDS

There were a total of 134 Hazard SAFECOMs reported. The following 2 graphs display 1) the top 5 Hazard SAFECOMs reported in FY18 and 2) the number of Hazard SAFECOMs for the past 10 years.

Top 5 Hazards by Subcategory - FY18

Subcategory	Count
COMMUNICATIONS	25
FOD	12
MISSION EQUIPMENT	24
OTHER	17
POLICY DEVIATION	15

Top 5 Hazard Subcategories reported - FY09- FY18

Subcategory	Count
COMMUNICATIONS	245
MISSION EQUIPMENT	172
OTHER	209
PILOT ACTION	192
POLICY DEVIATION	211

TREND TRACKING: Hazard	FOD - (Foreign Object Debris)

Aircraft damage due to FOD (Foreign Object Debris) is being reported with more frequency than ever before, and has made it into the Top 5 most reported hazards of FY2018. FOD can be defined as "any foreign object that does not belong on the runway, taxiway, or ramp area. FOD can cause damage to aircraft, and in rare instances, cause an accident" (FAA, 2013 at https://www.faa.gov/). Typical FOD items are aircraft parts, tire fragments, mechanics' tools, nails, luggage parts, garbage, broken pavement and stones. **A LITTLE BIT OF FOD IS NOT OK**. Even small objects can be ingested into engines (see picture below), cause cracked windscreens, become lodged in aircraft operating mechanisms or puncture aircraft tires. The FAA has more information on FOD at https://www.faa.gov/ including Advisory Circulars and the FAA Fact Sheet – Foreign Object Debris (FOD).

The FOD reports vary, but a sample of the reports received in FY18 include: a screw found in an aircraft tire, loose pad markers dislodging and going through a rotor system, tools left on an aircraft after maintenance, bird impacts, and even one report of bullet fragments found in the asphalt at an Airtanker Base prompting a FOD walk.

The picture to the left is foreign object damage to the compressor blades of a Honeywell LTS101 turboshaft engine on a Bell 222, caused by a small bolt that passed through the protective inlet screen.

Photo Credit: Alan Radecki, Northrop Grumman Corporation

INCIDENTS

There were a total of 84 Incident SAFECOMs reported in FY18.   The graphs in this section display the top 5 Incident SAFECOMs reported (listed by subcategory) and the total number of Incident SAFECOMs (by subcategory) reported for the last 10-years.   This section also provides a special emphasis on Bird Strikes.

Top 5 Incidents by Subcategory FY18

Top 5 Incidents by Subcategory - FY09-FY18

Total #Incident Reports – Past 10 Years
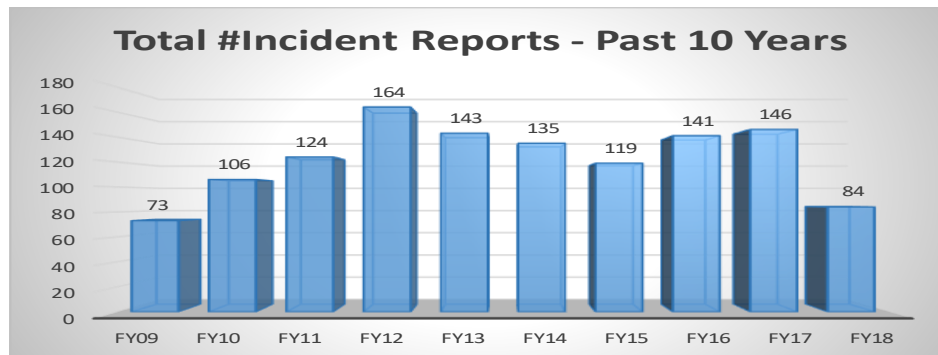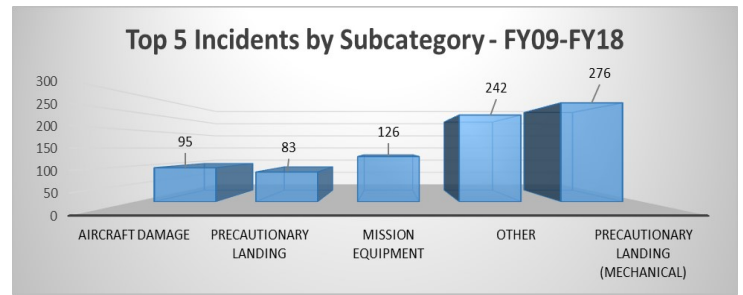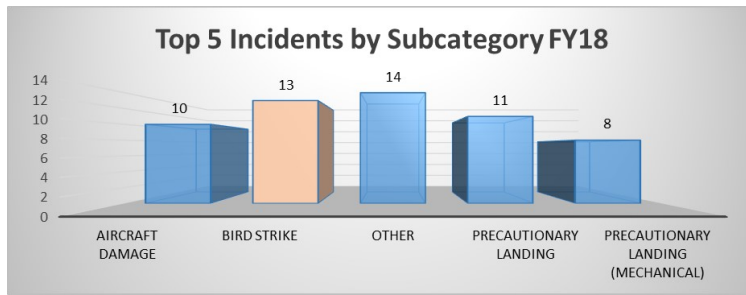
TREND TRACKING: INCIDENTS   Bird Strikes

The graph below illustrates the 50 bird strikes experienced over the past 10 years. The trendline shows the moving average, suggesting an upward trend in the number of bird strikes being reported. An Interagency Lessons Learned was published (IALL 18-04) discussing the hazards and offering guidance for avoiding and/or dealing with bird strikes. Additionally AOPA Bird and Wildlife Strikes, provides additional information at https://www.aopa.org/training-and-safety/active-pilots/safety-and-technique/bird-and-wildlife-strikes. If you experience a bird strike, remember to fill out the FAA Bird/Wildlife Strike Report as well as a SAFECOM.
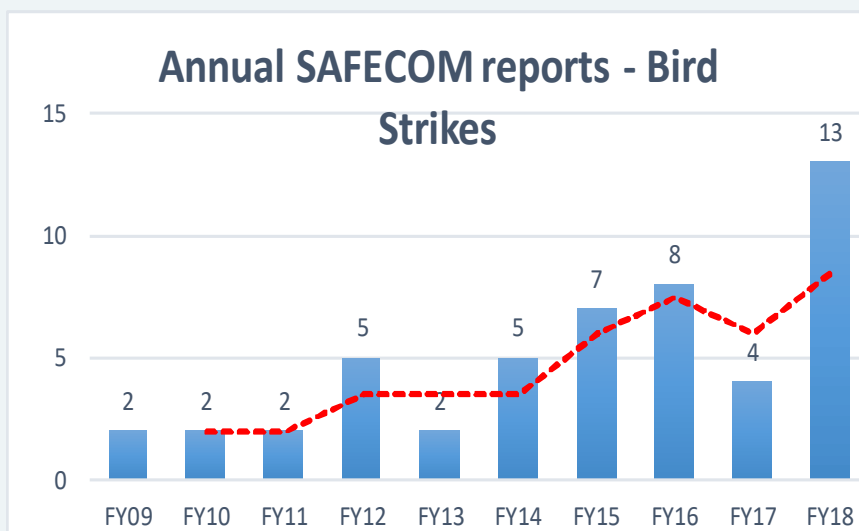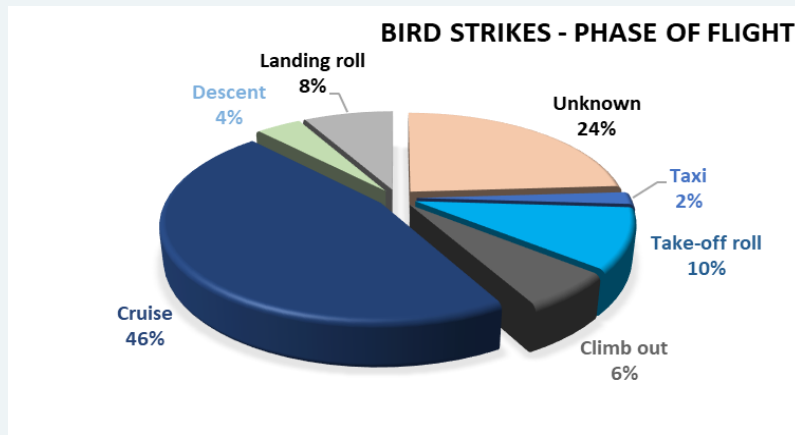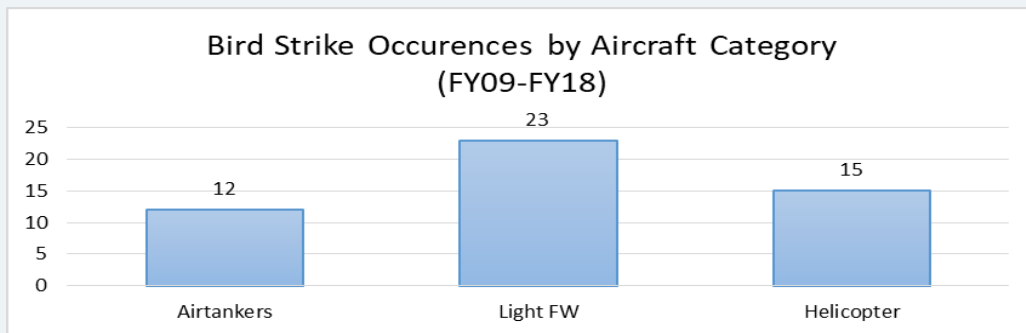

Annual SAFECOM reports - Bird Strikes

Photo from SAFECOM database

*--- Trendline represents the moving average (10 year average = 5 bird strikes/year)

TREND TRACKING – BIRD STRIKES, CONTINUED

BIRD STRIKES - PHASE OF FLIGHT

- Landing roll 8%
- Descent 4%
- Unknown 24%
- Taxi 2%
- Take-off roll 10%
- Climb out 6%
- Cruise 46%

**Unknown = evidence of bird strike was discovered during a pre- or post-flight inspection

Bird Strike Occurences by Aircraft Category (FY09-FY18)

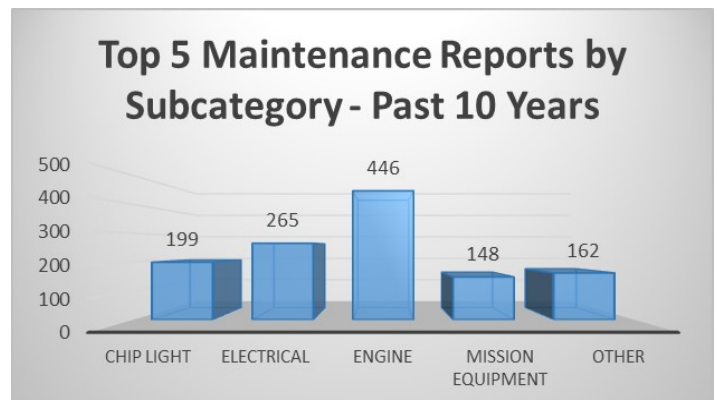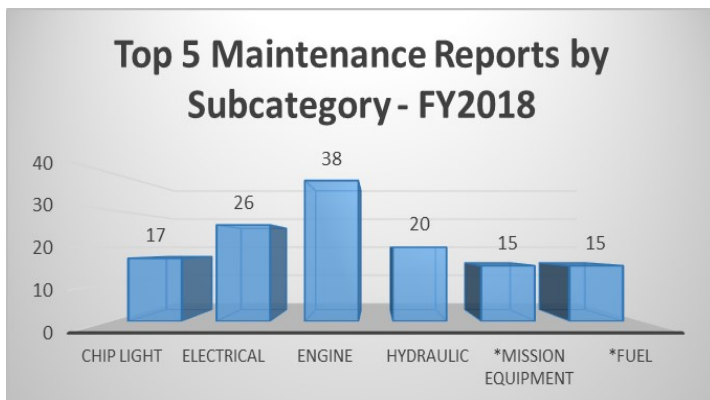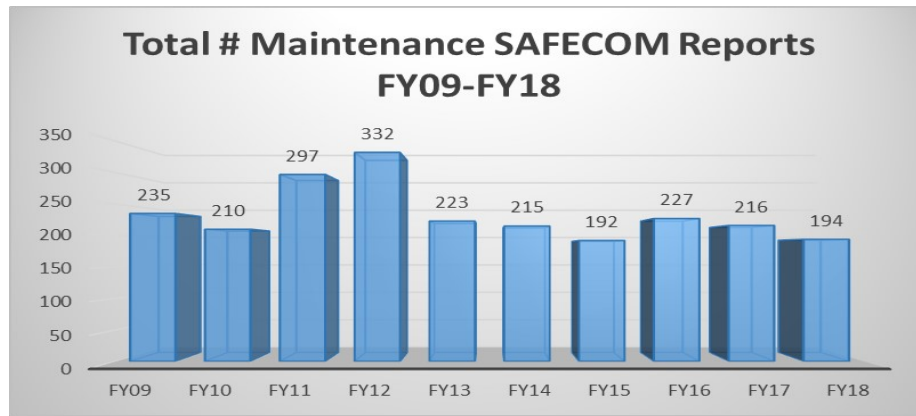| Category	Count
Airtankers	12
Light FW	23
Helicopter	15

MAINTENANCE

There were a total of 194 maintenance related SAFECOMs reported in FY18, which includes several subcategories. This section provides graphs displaying the top 5 Maintenance SAFECOMs reported by subcategory and the total number of maintenance SAFECOMs reported for the past 10 years. Maintenance related SAFECOMs accounted for 44.5% of all the FY18 USFS SAFECOM reports. Engine maintenance discrepancies continue to be the most reported; there were a total of 38. Five (5) of the 38 were either an engine failure or required an engine shutdown.

All Maintenance-related SAFECOMs are reviewed by Forest Service Airworthiness Inspectors to ensure all maintenance is completed in accordance with the contract.

Top 5 Maintenance Reports by Subcategory - FY2018

Subcategory	Count
CHIP LIGHT	17
ELECTRICAL	26
ENGINE	38
HYDRAULIC	20
*MISSION EQUIPMENT	15
*FUEL	15

Top 5 Maintenance Reports by Subcategory - Past 10 Years

Subcategory	Count
CHIP LIGHT	199
ELECTRICAL	265
ENGINE	446
MISSION EQUIPMENT	148
OTHER	162

*Fuel and Mission Equipment are equal at 15 reports each

**Total # Maintenance SAFECOM Reports FY09-FY18**

MANAGEMENT

There were a total of 16 management related SAFECOMs reported, which includes both internal (13) and external (7) subcategories.   Some Management SAFECOM reports are categorized as both internal and external, which results in the sub-category number exceeding the total number of Management reports. Below are the SAFECOM reports classified as Management, sub-categorized by internal and external. Management SAFECOMS may include poor planning, scheduling or oversight, conflicting or lack of procedures/policy, deviations from policy/procedures or agreements.

**# Management SAFECOMs by subcategory FY09-FY18**
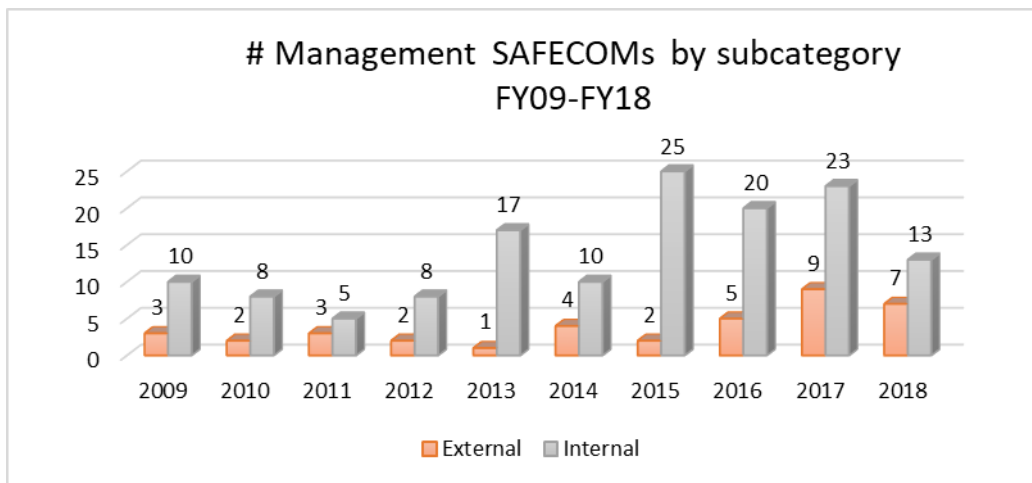
MISHAP PREVENTION

There were a total of only 7 Mishap Prevention SAFECOMs in FY18, which is a large departure from the 10 year average of 30 per year. This category recognizes the positive actions of aviation personnel that contribute to safe attitudes, behaviors and outcomes. Most Airwards come from the SAFECOM system under this category. It is concerning that the number of reports plummeted in FY18. *Let's all make sure that people understand the SAFECOM system is also for reporting the great contributions people make towards safe outcomes.*

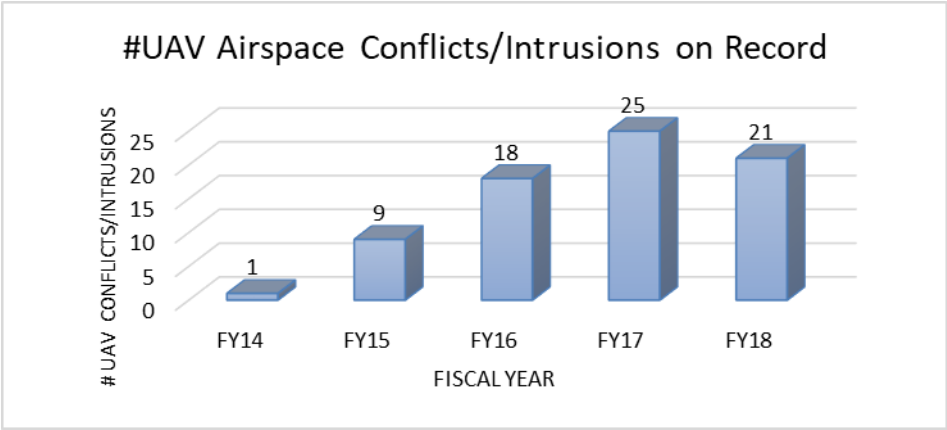**# Mishap Prevention SAFECOMs- FY09- FY18**
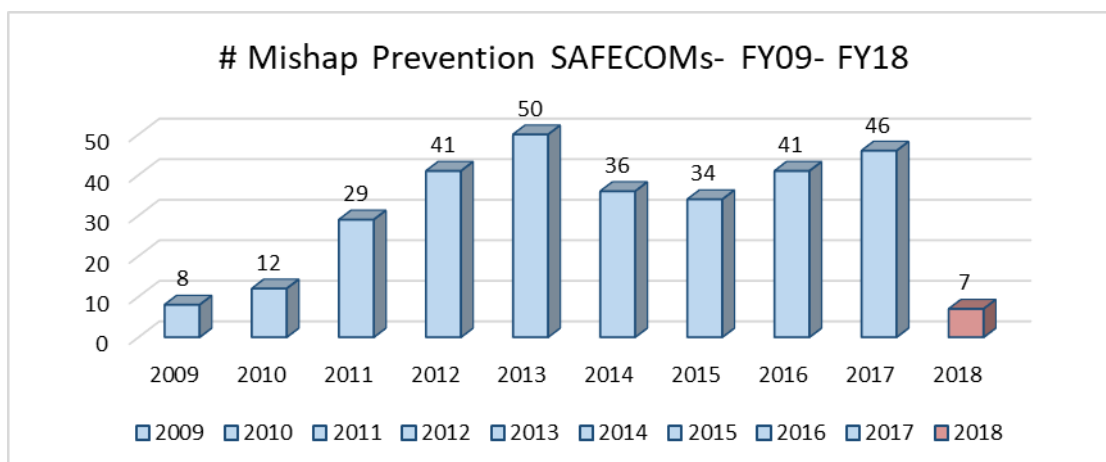
UNMANNED AERIAL SYSTEMS

UAS was added as a main category in the SAFECOM system over year ago, in 2017, to help capture safety events related to the growing use of UAS by both federal agencies, cooperators and the public. The primary use of UAVs in the Forest Service is for mapping and gathering video or photo data for land management activities. There were 17 reports in the UAS main category in FY18 related to fleet operations – these reports included software issues, maintenance, loss of link, loss of GPS, and one mishap where the UAV lost power momentarily on climb out and struck a tree with its right wing. The red center column showing 8 incursions is also counted in the UAS Airspace Conflicts/Intrusions on Record graph (below).

FY18 UAS SAFECOMS BY SUBCATEGORY
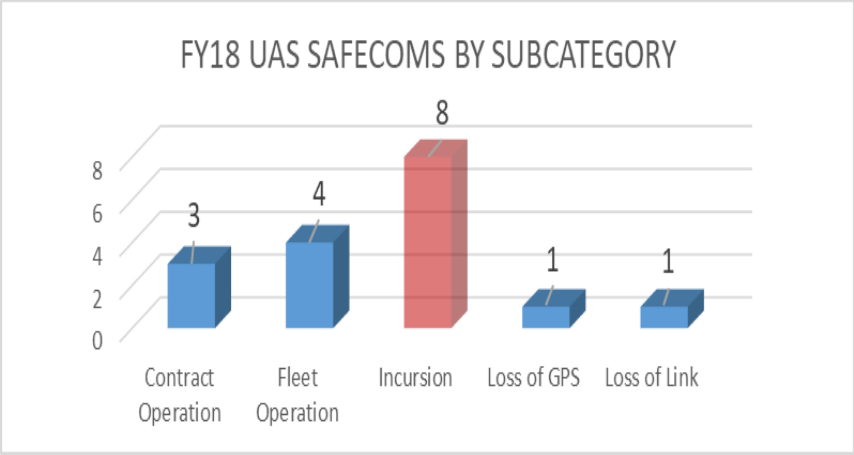
The UAS Airspace conflict graph at the right displays the number of SAFECOM reports representing a combined total from the categories/subcategories of UAS/Incursion, Airspace/UAS as well as those reports of Airspace/Conflict and Airspace/Intrusion where UAV/UAS operations were involved. Due to the sharp rise in UAV conflicts experienced with fire-fighting aircraft, The National Multi-Agency Coordinating Group released formal correspondence in June 30, 2017 relating to Unmanned Aircraft System (UAS) incursions on fires. In February 2019, NWCG released the *Standards for Fire and Unmanned Aircraft Systems Operations (NWCG Standards)* that establishes the processes and procedures for interagency use of UAS. UAS Incursion Protocols for reporting are found in Appendix A of the NWCG Standards document located online at: https://www.nwcg.gov/sites/default/files/publications/pms515.pdf

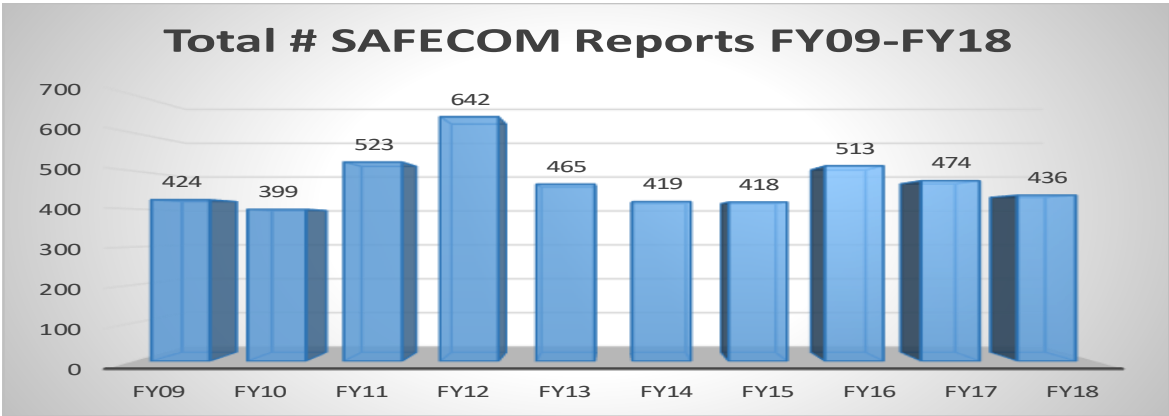#UAV Airspace Conflicts/Intrusions on Record

Reporting UAS safety concerns in the SAFECOM is important to ensure notifications have been made and to track trends related to public outreach and education to ensure these efforts are having the desired effect on safety. If an incursion is experienced, note the UAS information such as color, size, altitude, and flight pattern and report it following the protocol listed in Appendix A (described above).

Additional FAA guidance for law enforcement personnel can be found at: https://www.faa.gov/uas/resources/policy_library/media/FAA_UAS-PO_LEA_Guidance.pdf.
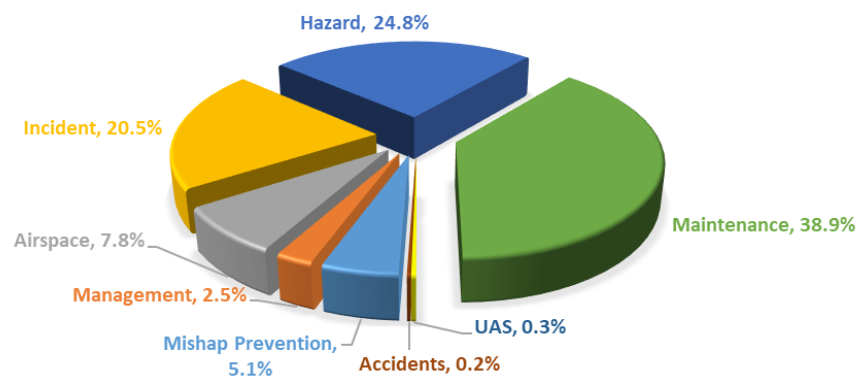
10-Year SAFECOM Data

Year	Number of SAFECOM's
2018	436
10-Year Total	4713
10-Year Average	471

Total # SAFECOM Reports FY09-FY18

FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18
424	399	523	642	465	419	418	513	474	436

PERCENTAGE OF SAFECOMS BY MAIN CATEGORY - 10 YEAR STATS (FY09-FY18)

- Hazard, 24.8%
- Incident, 20.5%
- Airspace, 7.8%
- Management, 2.5%
- Mishap Prevention, 5.1%
- Accidents, 0.2%
- UAS, 0.3%
- Maintenance, 38.9%

SAFECOMs By FS Region – FY2018 (FS Operational control only)

The amount of reporting in each Forest Service Region generally correlates with the amount of flight hours and complexity of missions flown. Regional Aviation Safety Managers (RASMs) follow up on each and every SAFECOM received in their respective Region by evaluating and providing necessary lessons learned when appropriate.

FY18 - #SAFECOM Reports by FS Region
Flight hour correlation

R1	R2	R3	R4	R5	R6	R8	R9/NEA	R10
37	37	33	70	117	94	19	11	9
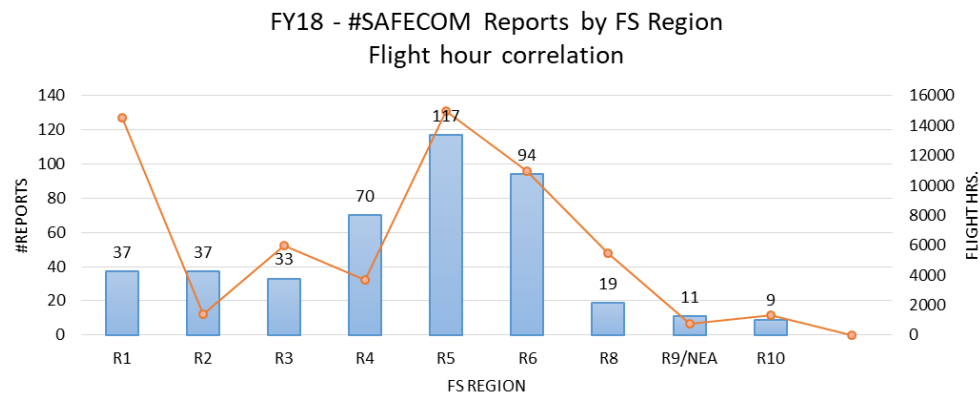
*Does not include "State" or "Other" SAFECOM statistics

FLIGHT HOUR STATISTICS

10 – YEAR FLIGHT HR STATISTICS

					USFS Fleet/	
Fiscal Year	Fixed Wing	Helicopter	LAT	*SEAT	Leased	Total
2018	24,443	45,546	6,762	3,673	7,051	87,475
2017	23,217	45,285	7,625	393	8,606	85,126
2016	18,238	32,594	5,997	558	7,684	65,071
2015	21,709	32,253	4,710	484	8,424	67,580
2014	17,910	27,769	3,405	505	7,894	57,483
2013	22,972	34,860	2,966	534	8,672	70,004
2012	26,299	40,904	3,382	821	9,728	81,134
2011	22,846	34,106	4,550	578	9,126	71,206
2010	15,227	18,707	2,853	379	7,667	44,833
2009	18,576	26,439	3,684	781	8,056	57,536
10 Year Totals	211,437	338,463	45,934	8,706	82,908	687,448
Averages	21,144	33,846	4,593	871	8,291	68,745

*There has been a change in the way SEAT flight hours are tracked by the BLM, resulting in a significant increase shown in the table above as compared to prior years. This new method of tracking more accurately tracks flight hours that benefit Forest Service operations.

SAFECOMs REPORTED vs FLIGHT HOURS – FY09-FY18

There is a general positive correlation between the flight hours (an indicator of operational tempo) and the number of reports (reporting culture) over the past 10 years, until 2017, when the number of reports departs (downward) from the flight hours. Interpreting this is only speculative, but the reporting trend appears to be in decline. Because flight hours and the number of SAFECOM reports appear to have positive correlation in the past, this information will continue to be reviewed and trended.
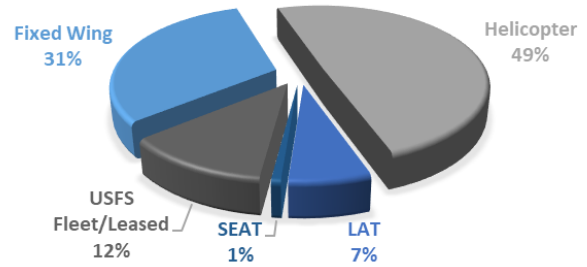

SAFECOM Reports vs Annual Flight Hours
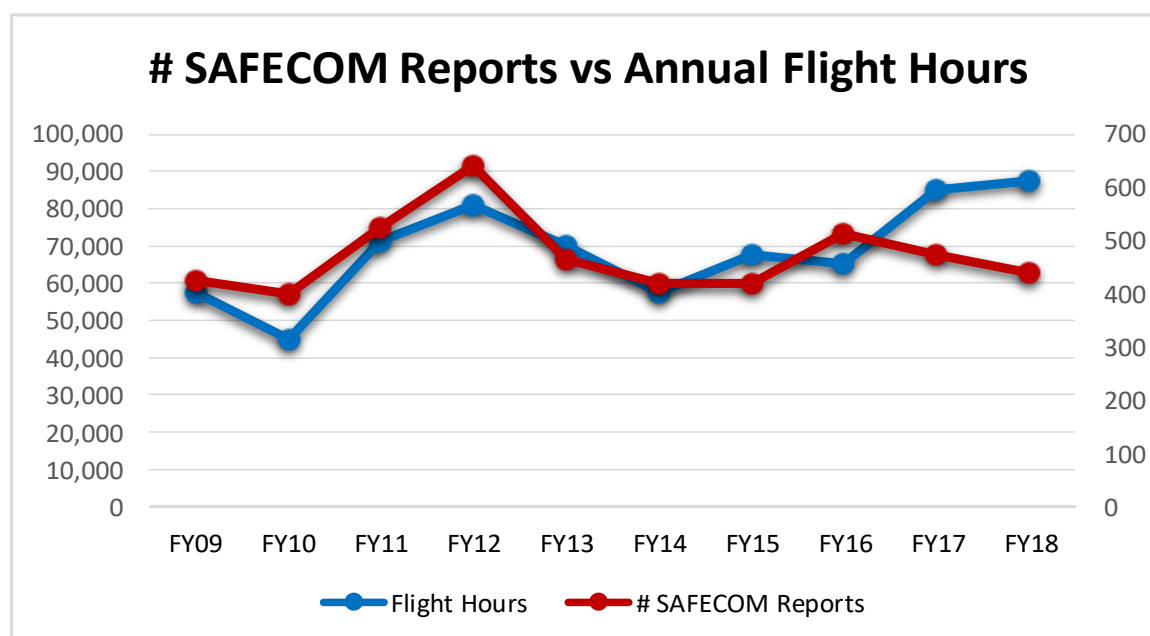
AIRCRAFT FLIGHT HR PERCENTAGES BY AIRCRAFT TYPE

AIRCRAFT FLIGHT HR PERCENTAGES BY A/C TYPE (FY18)

54%
29%
8%
8%
1%

- Fixed Wing
- Helicopter
- LAT
- SEAT
- USFS Fleet/Leased
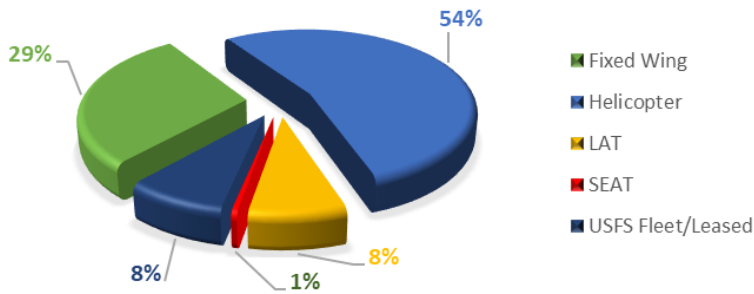
10 YR AVERAGES (FY09-FY18) FLIGHT HRS BY A/C TYPE

Fixed Wing 31%
Helicopter 49%
USFS Fleet/Leased 12%
SEAT 1%
LAT 7%

FLIGHT HOURS – 10 YEAR AVERAGES vs FY18 BY AIRCRAFT TYPE

Year	Fixed-Wing	Helicopter	Airtanker	SEAT	USFS Fleet/ Leased	Total
2018	24,443	45,546	6,762	3,673	7,051	**87,475**
10-YR Totals	211,437	338,463	45,934	8,706	82,908	**687,448**
10-YR Avg.	21,144	33,846	4,593	871	8,291	**68,745**

10 YR Avg vs Hours flown in FY18

68,745 — 10 Year Avg
87,475 — FY18 Hrs
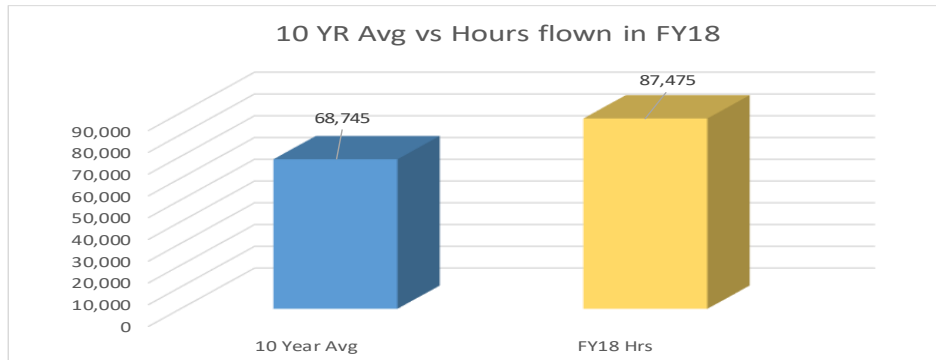
LAGGING INDICATORS: AIRCRAFT MISHAPS & FATALITIES

Forest Service Aviation Statistics for 2018:	
Statistics	**Rates**
• Accidents – 3 • Incidents -3 • Fatalities - 0	2018 Accident Rate: 3.43 (*10-year = 1.75*) 2018 Fatal Accident Rate: 0 (*10 year = 0.58*) 2018 Fatality Rate: 0 (*10 year = 1.31*)

FY 2018 ACCIDENT STATISTICS - RATE CALCULATIONS

Formulas Used: Industry Standard "Per 100,000 Hours Flown"

Accident Rate = Number of accidents divided by the number of hours flown multiplied by 100,000 hours.
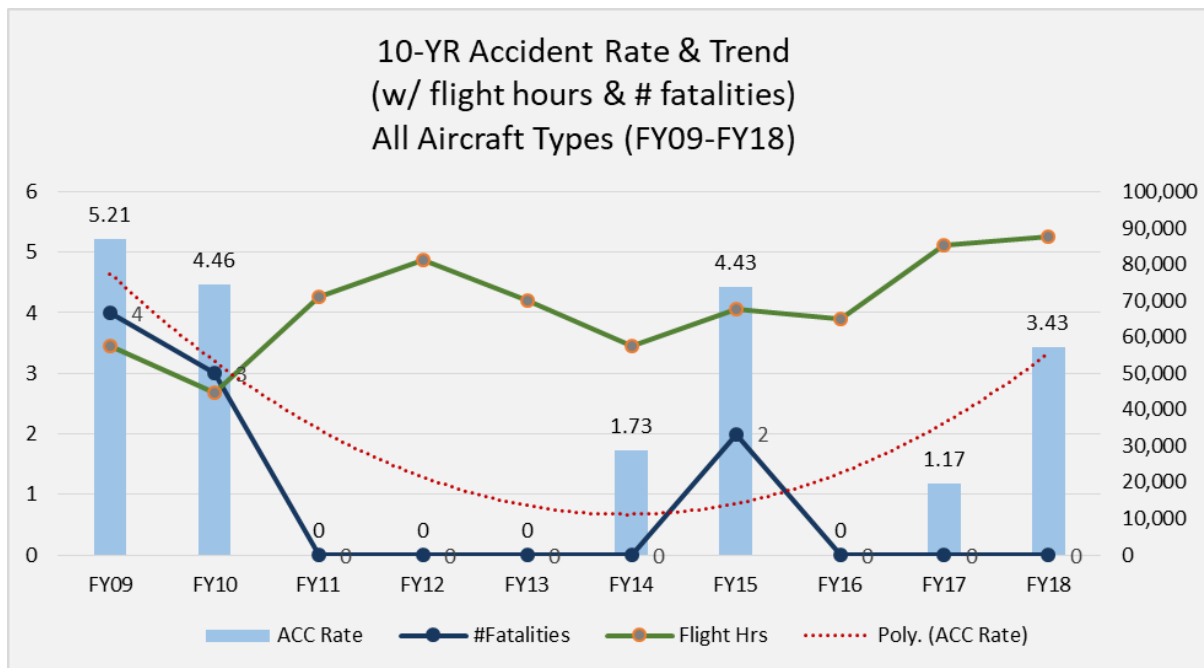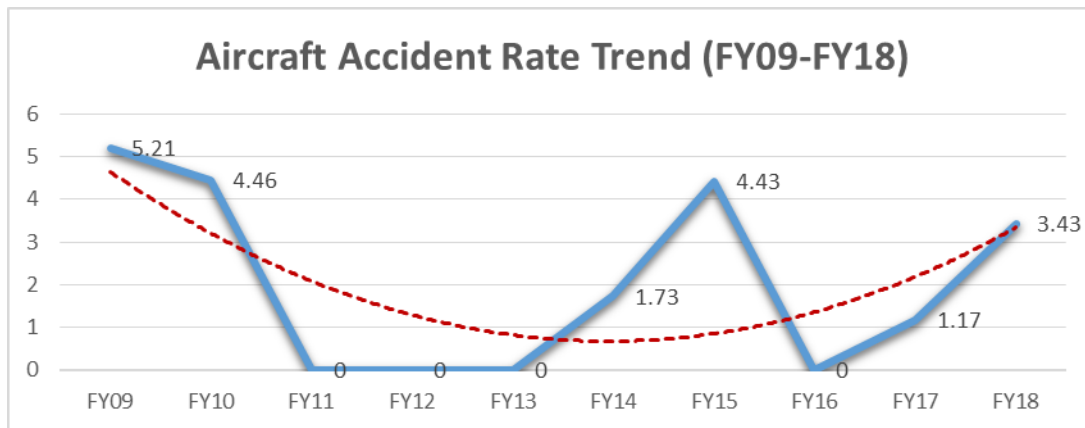
Fatal Accident Rate = Number of fatal accidents divided by the number of hours flown multiplied by 100,000 hours.

Fatality Rate = Number of fatalities divided by the number of flight hours multiplied by 100,000 hours

** *All rates provide a ratio between the number of accidents, accidents with fatalities, and fatalities experienced in a given period of time based on hours of flight. This ratio is a quantitative method of calculating overall accident risk per 100,000 hours of flight.*

FY18 AND 10-YEAR - ACCIDENT STATISTICS

FY18 ACCIDENT STATISTICS					
Aircraft Type	Hours	Number of Accidents	Accident Rate	Number of Fatalities	Fatal Accident Rate
Fixed-Wing	24,443	1	4.09	0	0
Helicopter	45,546	1	2.20	0	0
Airtanker	6,762	0	0	0	0
Single Engine Airtanker (SEAT)	3,673	1	27.23	0	0
USFS Fleet/Leased	7,051	0	0	0	0
Total	**87,475**	**3**	**3.43 (FY18 RATE)**	**0**	**0**

Aircraft Accident Rate Trend (FY09-FY18)

10-YR Accident Rate & Trend (w/ flight hours & # fatalities) All Aircraft Types (FY09-FY18)

- - - - **Polynomial Trendline Equation: y = 0.1625x2 - 1.9327x + 6.4182; (R² = 0.3821)**

Trending Data: The accident trend line indicates the general pattern or direction of time series data (information in sequence over time). The polynomic trend line is used to show the general pattern as data fluctuates. The trendline for 10 years of accident statistics displays a significant dip in the trend which consequently began after the implementation of SMS processes into safety audits, inspections, training, and everyday operations. However, there is a notable upward trend as a result of accidents that have occurred in the past 2 years. The number of flight hours has remained relatively constant.

Aviation Accidents
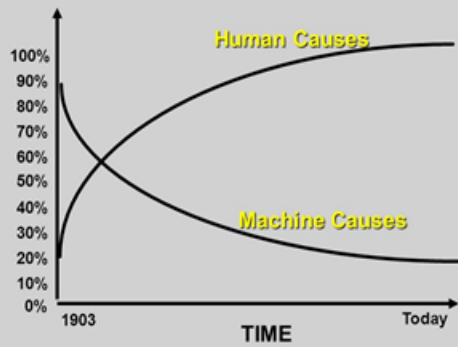
FAA statistics on a national scale support the premise that human factors, rather than mechanical failure, underlie most aviation accidents and incidents. The number of mechanical-related accidents, conversely, has declined over time. More reliable aircraft designs have been responsible for much of the progress made in reducing the accident rate and increasing efficiency. However it is much harder to predict and influence the innate characteristics associated with human behavior, decision-making and performance. This is why the estimated 80% of aviation accidents attributed to human factors has remained steady over time.

Slide Reference: FAA SMS course; Boise, ID; March 2008)

Accident data associated with accidents under the operational control of the Forest Service (FS) show the *opposite of the national trends associated with FAA data*. Rather than 80% of FS accidents being attributed to human factors, 75% of the accidents in the past 10 years have been attributed to *mechanical* factors (NOTE: the NTSB determines causal factors—these determinations are used to assess human vs mechanical factors).
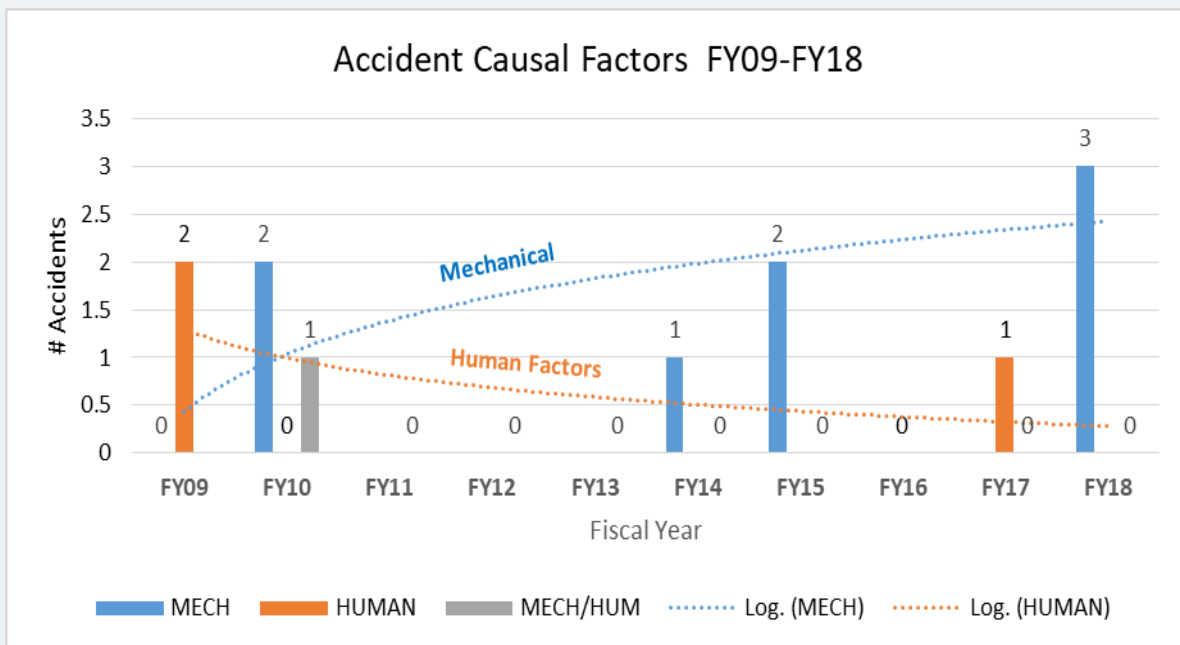
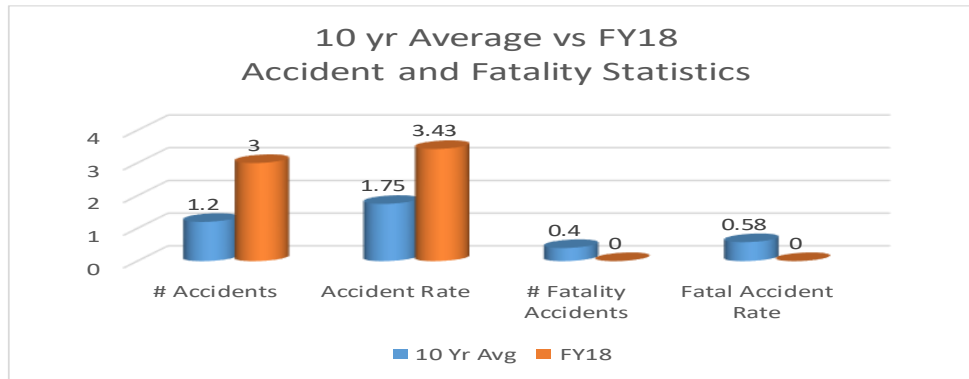One accident was considered to be equally resultant of human and mechanical factors after a mechanical failure was followed by the pilot's improper execution of an emergency landing procedure--ultimately ending up in a mishap (NTSB determination).

10 YEAR AVG vs FY18 – ACCIDENT AND FATALITY STATS

COMPARISON OF 10—YR AVERAGE vs FY18

	10 Year Average	FY2018	Comparison
Hours flown	68,745	87,475	+18,730
Number of Accidents	1.2	3	+1.8
Number of Fatalities	0.9	0	-0.9
Accident Rate	1.75	3.43	+1.68
Fatal Accident Rate	0.58	0	-0.58

10 year averages for "rates" are calculated using the following formula: (ex: 10-yr. ACC rate = 12/687,448 x 100,000 hrs = 1.75)

ACCIDENT DATA BY AIRCRAFT CATEGORY: FY09-FY18

*One of the Helicopter Accidents was not an accident with the aircraft itself, but a fatality that occurred as a result of an unarrested decent during a rappel proficiency. Per NTSB definition, this counts as an <u>Aircraft Accident.</u>

A/C Category	Fixed-Wing	*Helicopter	Airtanker	SEAT	USFS Fleet/ Leased	Total
# Accidents	2	5	3	1	1	12
# Fatal Accidents	1	2	1	0	0	4
# Fatalities	3	3	3	0	0	9

MISHAP SUMMARY – FY18

Date	Aircraft Type	Mishap Category	Fatalities or Injuries	Mishap Description	A/C Procurement
08/08/2018	Cessna T337	Accident	0 injuries, 0 fatalities	Mechanical – Hydraulic; No Gear Landing	CWN
08/14/2018	AT-802	Accident	1 serious injury, 0 fatalities	Mechanical - Engine	CWN
08/25/2018	Bell 212	Accident	1 serious injury 0 fatalities	Mechanical	Exclusive Use
7/18/2018	Bell 205 A-1	Incident	0,0	Mechanical – Forced Landing- Engine	Exclusive Use
07/30/2018	MD-87	Incident	0,0	Mechanical - Engine Failure on Take-off	Exclusive Use
09/17/2018	Sikorsky S-61	Incident	0,0	Human Factor – Main Rotor Blade Strike	Exclusive Use

30 YEAR AIRCRAFT ACCIDENT & FATALITY TREND

* SMS implemented by Policy in 2010

30-YR FS Aviation: # Accidents and # Fatalites (FY1989-FY2018)
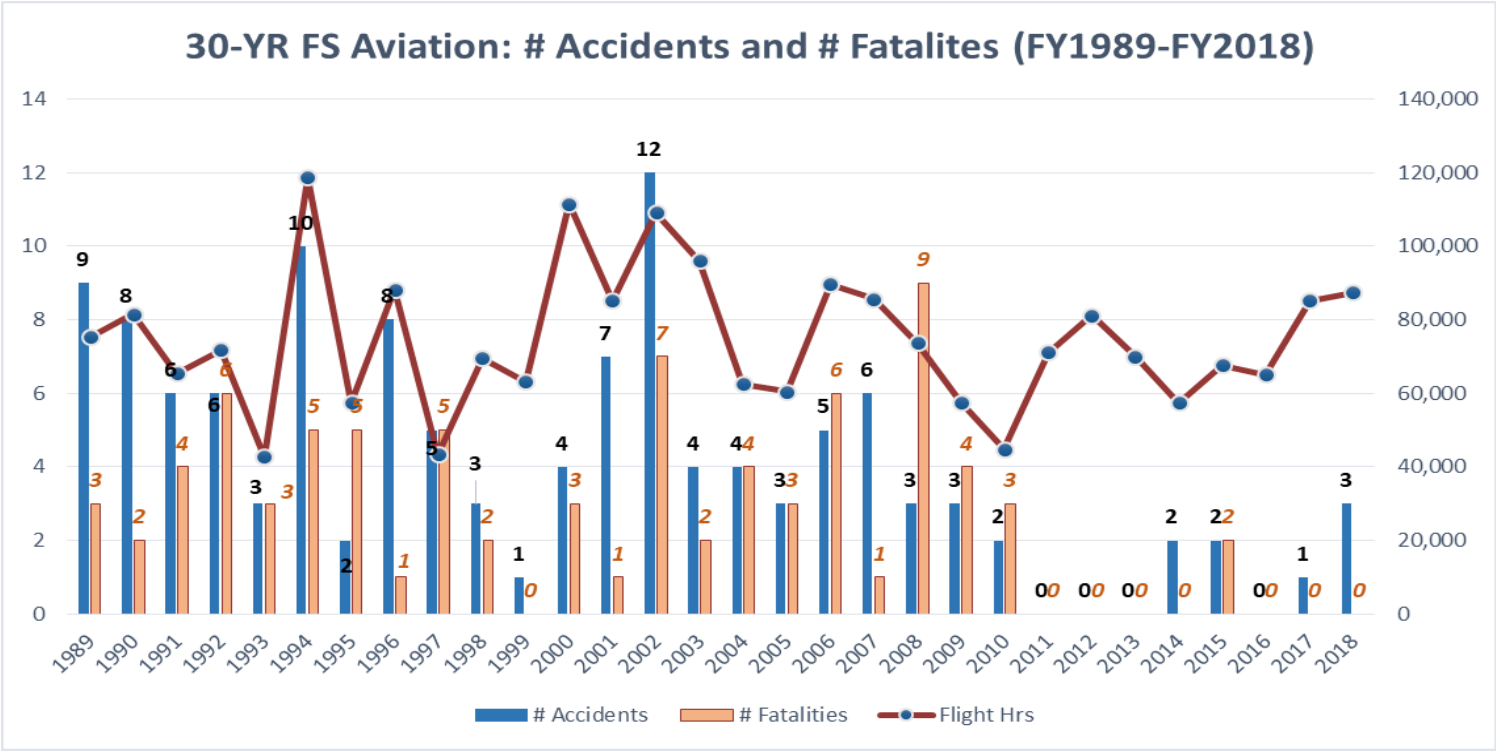
AIRCRAFT ACCIDENT STATS & FLIGHT HOURS BY AIRCRAFT TYPE

USFS FLEET/LEASED AIRCRAFT STATISTICS

This includes the 25 Forest Service owned fleet aircraft (20 fixed-wing, 3 helicopter and 2 airtankers) and 14 leased Forest Service-operated aerial supervision aircraft. The Forest Service owned and leased aircraft accounted for 7,051 flight hours in FY 2018; the 10 year average for flight hours is 8,291. Fleet aircraft accounted for 8% of the total flight hours; 10 year the average is 12%. There were no accidents involving Forest Service owned/operated aircraft in FY18.

FY	Flight Hours	#Accidents	Accident Rate	Fatal Accidents	Fatal Accident Rates	Fatalities
2018	7,051	0	0	0	0	0
10 Year Totals	82,908	1		0		0
10 YR. Avg.	8,291	0.1	1.21	0	0	0

USFS Fleet/Leased Flight Hrs and Trend
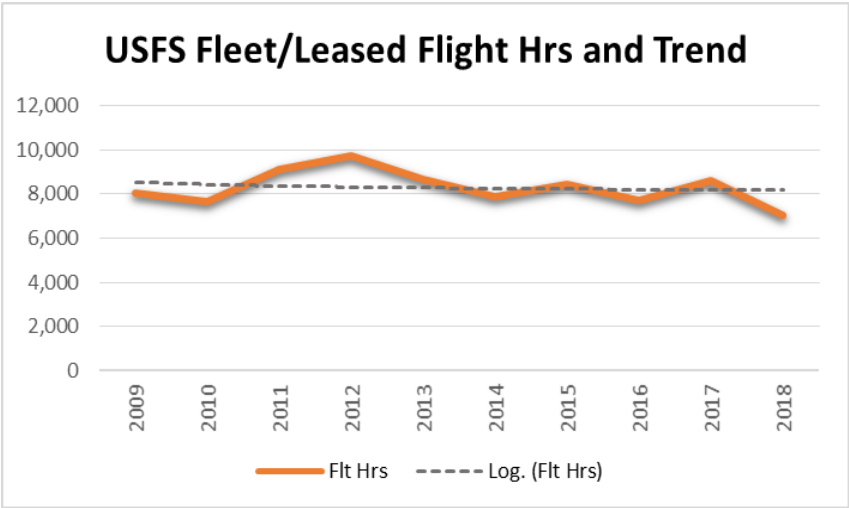
FIXED-WING AIRCRAFT STATISTICS

This includes all contract fixed-wing aircraft, excluding all airtankers. These aircraft accounted for 28% of the total hours flown; the 10-year average is 31%. There were 24,443 hours flown, the 10-year average is 21,144 hours. There was on fixed-wing accident in FY18 with no injuries.
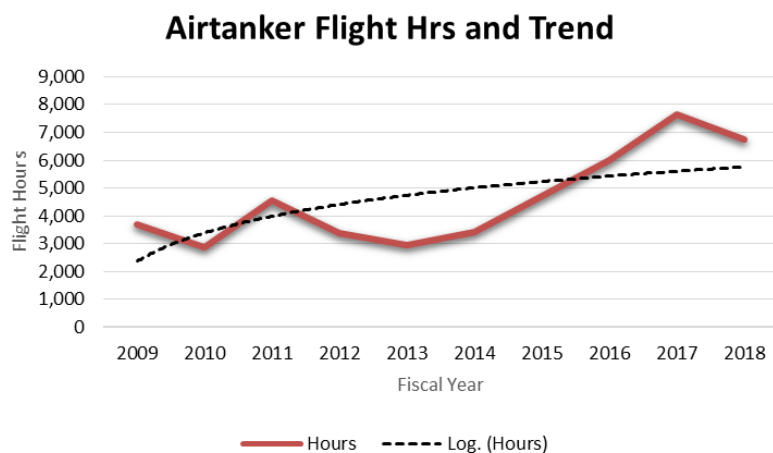
FY	Flight Hours	#Accidents	Accident Rate	Fatal Accidents	Fatal Accident Rates	Fatalities
2018	24,443	1	4.09	0	0	0
10 Year Totals	211,437	4		1		3
10 YR Avg.	21,144	0.40	1.89	0.1	0.47	0.3
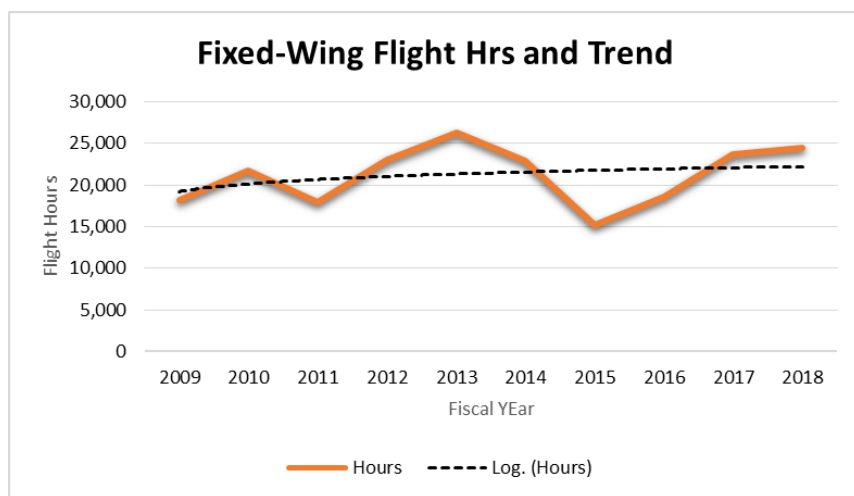
AIRTANKER STATISTICS

This includes all contract multi-engine/jet large and very large airtankers and scoopers. Airtankers compiled 6,762 flight hours in FY18; the 10 year average is 4,593. Airtankers accounted for 7% of the total hours flown in FY18; the 10-year average is 6.7%.

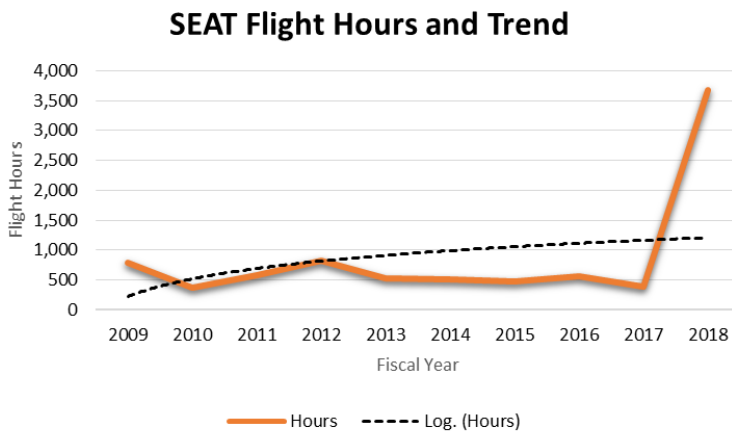| FY	Flight Hours	#Accidents	Accident Rate	Fatal Accidents	Fatal Accident Rates	Fatalities
2018	6,762	0	0	0	0	0
10 Year Totals	45,934	3		1		3
10 YR Avg.	4,593	0.3	6.53	0.1	2.17	0.3

SINGLE ENGINE AIRTANKER STATISTICS

This includes all contract Single Engine Airtankers (SEAT). The total flight hours for SEATs in FY18 was 3,673; the 10 year average is 871. The significant increase in flight hours for SEATs is due to an improved tracking system used by the BLM. SEATs accounted for 4% of the flight hours in FY18; which is above the 10 year average of 1%. There was one SEAT accident in FY18, with 1 person receiving serious injuries.

FY	Flight Hours	#Accidents	Accident Rate	Fatal Accidents	Fatal Accident Rates	Fatalities
2018	3673	1	27.23	0	0	0
10 Year Totals	8,706	1		0		0
10 YR Avg.	871	0.1	11.49	0	0	0

SEAT Flight Hours and Trend

HELICOPTER STATISTICS

This includes all contract helicopters. Helicopters accounted for 52% of the flight hours, the 10-year average is 49%. Total helicopter flight hours accumulated in FY18 was 45,546; the 10 year average is 33,846. There was one (1) helicopter accident in FY18, with one person receiving serious injuries.

Year	Flight Hours	#Accidents	Accident Rate	Fatal Accidents	Fatal Accident Rates	Fatalities
2018	45,546	1	2.20	0	0	0
10 Year Totals	338,463	4		2		3
10 YR Avg.	33,846	0.4	1.18	0.2	0.59	0.3

Helicopter Flight Hours and Trend
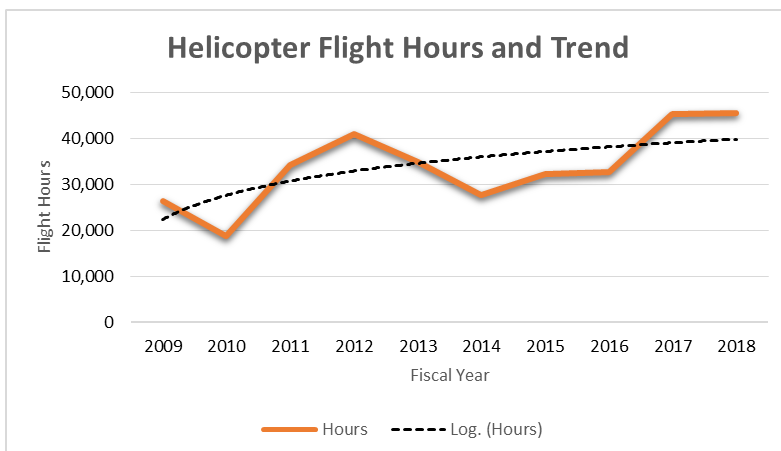
AIRCRAFT CATEGORY DEFINITIONS

USFS Fleet/Leased includes a total of 39 aircraft; 25 fleet aircraft (20 fixed-wing, 2 airtankers and 3 helicopters) and 14 leased fixed-wing aircraft.

Fixed-Wing Aircraft includes all contract fixed-wing, excluding all airtankers.

Helicopters include all contract helicopters, including tanked helicopters.

Airtankers include all contract multi-engine/jet, large and very large airtankers and scoopers.

SEAT's (Single Engine Airtankers: the USFS has only one SEAT on contract through DOI-OAS, however the hours are obtained from DOI-OAS for all SEAT's utilized on USFS missions.

AIRCRAFT MISHAP DEFINITIONS

Aircraft Accident: An occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight and the time all such persons have disembarked, and in which any person suffers death or serious injury or in which the aircraft receives substantial damage. During a jump sequence, a Forest Service smokejumper is considered to have safely disembarked the aircraft after detaching from the static line from the parachute deployment system and when the parachute canopy has successfully deployed. (Refer to 49 CFR Part 830, Subpart B—Initial Notification of Aircraft Accidents, Incidents, and Overdue Aircraft; 830.5 and 830.6 for information regarding reportable accidents)

Aircraft Incident With Potential (IWP):   An "in-flight incident" that narrowly misses being an accident by NTSB definition and circumstances may involve some aircraft damage, property damage, or minor injury to crew or passengers. Classification of Incidents with Potential is determined by the US Forest Service, Branch Chief - Aviation Safety Management Systems.

Operational Control is defined as the exercise of authority over initiating, conducting, or terminating a flight (14 CFR Part 1.1). This includes direct management oversight, supervision and accountability for a specific task, mission or assignment.

Forest Service fleet aircraft or aircraft on contract to the USFS that have a mishap while under operational control of another agency (i.e. BLM, NPS, FEPP, State, etc.) are not USFS reportable mishaps but that of the agency with operational control.

Cooperator aircraft (fleet and contract) under operational control of the USFS that have a mishap are USFS reportable mishaps and are included in these statistics.

Military aircraft remain under the operational control of the military even while supporting USFS operations.

ACRONYMS/DEFINITIONS

ACC: Short for "Accident"

ACE: Aviation Centered Education (Interagency)

AIRWARD: an interagency safety awareness campaign that recognizes individuals for significant contributions to mishap prevention

AMI: Aircraft Maintenance Inspector

BLM: Bureau of Land Management

CFIT: Controlled Flight Into Terrain

CRM: Crew Resource Management

DOI: Department of Interior

FAA: Federal Aviation Administration

FEPP: Federal Excess Personal Property

FS: Forest Service

FSM: Forest Service Manual

FTA: Fire Traffic Area

FW: Fixed Wing

FY: Fiscal Year

HAI: Helicopter Association International

HIP: Helicopter Inspector Pilot

HOS: Helicopter Operations Specialist

IASA: Interagency Aviation Safety Alert

IAT: Interagency Aviation Training

IWP: Incident With Potential (*Note: IWP will no longer be an incident category in 2019—all categorizations will be just "incidents"*)

LGAT- Large Airtanker

MAFFs: Modular Airborne Fire Fighting System

NMAC: Near Mid-Air Collision

NPS: National Park Service

NTSB: National Transportation Safety Board

OAS: Office of Aviation Services

QA: Quality Assurance

RASM: Regional Aviation Safety Manager

SAFECOM: Aviation Safety Communique (SAFECOM) database – an interagency safety reporting website used to report aviation safety issues and concerns

SEAT: Single Engine Airtankers

SME: Subject Matter Experts

SMS: Safety Management System

ACRONYMS/DEFINITIONS, CONT'D

UAS: Unmanned Aerial System --*is an all-encompassing term describing an entire operating system for the UAV: the ground control station with operator, communications equipment, support equipment etc.*

UAV: Unmanned Aerial Vehicle – associated with the UAS

USFS: United States Forest Service

WO: Washington Office (referring to the WO Fire and Aviation Staff)

REFERENCES:

FAA: Aviation Accidents – Slide Presentation at Safety Management Systems, Boise, ID; March 2008